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Viewpoint

Viewpoint: Future of food safety and nutrition - Seeking win-wins, coping with trade-offs

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ABSTRACT

The possible implications of global trends such as climate change and resource scarcity on food security are high on the political agendas. While the food sufficiency aspect of food security takes centre-stage, the future of food safety and nutritional quality of diets often seems to be taken for granted. This paper builds on the results of a foresight study on EU food safety and nutrition towards 2050 to discuss potential future points of tension for food policy. Increasing food production while using fewer resources and reducing food waste while ensuring food safety are just two examples. Innovation at different levels in the food system will be needed to address future challenges. Fast technology uptake and the launch of new food-related products can put pressure on the ability to deliver timely risk assessments, the scope of which might also need to cover other legitimate factors. Future food policies need to be more sensitive to impacts on food safety and nutrition and health aspects. A holistic food systems approach must be taken to identify and discuss in advance possible tensions and trade-offs and to address them upfront in a systematic and transparent manner.

1. Introduction

One of the key questions dominating the turn of this century is how to secure the supply of sufficient, environmentally sustainable, nutritious, safe and accessible-to-all food. Food security ('zero hunger') features very high among the recently agreed 17 Sustainable Development Goals (SDGs) and is intimately linked to several other SDGs (United Nations, 2015). Ensuring food security and a sustainable agro-food system is not an easy task, given the impacts of climate change and the need to reduce greenhouse gas emissions and to preserve key resources of particular importance for the water-energy-food nexus. The increasing global population and the transition in emerging market economies towards diets of predominantly animal origin, put additional pressure on ensuring sufficient food production (Alexandratos and Bruinsma, 2012). We have seen how disruptive events and geo-political developments such as the 2008 economic crisis or the 2015 EU/Russian embargo, which resulted in a 43% decrease of EU agri-food exports to Russia, had dramatic consequences for both food producers and consumers (Szczepanski, 2015). In addition, recent developments such as the decision of the United Kingdom to leave the European Union and the repercussions this may bring to both parties, demonstrate the need to take into account uncertainty in policy design.

While access to “safe” and “nutritious” food is integral in the definition of food security, most studies focus on how to ensure the “sufficiency” requirement of this definition. It can be argued that the reason for this is the high level of food safety currently enjoyed in developed regions. The EU in particular takes pride in its food safety legislative framework, which is seen as one of the most advanced in the world. This is achieved through science-based risk analysis based on the precautionary principle and an institutional separation of risk assessment, management and communication. But even in this environment, the occasional food 'crisis' such as the German EHEC O104:H4 outbreak (Robert Koch Institut, 2011), unearths the vulnerabilities of the system. One may also argue that ensuring safety, nutritional quality, variety and balance of foods and diets as well as the underlying social, environmental and economic determinants, do not receive the attention they deserve in food security studies, as the sufficiency aspect appears to be more pressing. Moreover, the abundant food offer and almost unrestricted access to a large variety of nutritious quality foods in most of the developed countries, result in the skewed view that it is up to the individual to make the right decisions and succeed in life and health. Making nutritious food available does not automatically lead to population-wide healthy diets (Butland et al., 2007). Despite a series of initiatives and action plans towards the promotion of healthier diets and

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prevention of chronic diseases (High Level Group on Nutrition and Physical activity, 2014; World Health Organisation, 2014), achieving health targets such as those defined in the WHO Noncommunicable Diseases Global Monitoring Framework 2025 (World Health Organization, 2015a) proves to be difficult already today.

To shed light on possible future challenges, we have analysed whether the EU's regulatory and policy framework in the areas of food safety and nutrition can ensure "safe food" and "good nutrition" as we look ahead to 2050 (Mylona et al., 2016). Drivers of change (global trade, agro-food chain structure, technology uptake, social cohesion, food values, climate change, depletion of natural resources and world population growth) were combined to create four alternative, plausible and challenging future scenarios (Mylona et al., 2016). While the study was intended to inform EU policies and to complement the recent Fitness Check of the General Food Law (Regulation (EC) No 178/2002), its conclusions are of relevance for almost every jurisdiction.

We identified several points of tension where policies or interventions that aim to improve food safety, the diets of populations or food sufficiency conflict with each other. We conclude that a holistic food systems approach must be taken to identify and discuss in advance such tensions, in order to find a compromise between equally important aspects of the food system and accept trade-offs in a systematic and transparent manner. And beyond trade-offs, such an approach could also identify synergies in different policy areas and lead to win-win scenarios. This opinion paper invites global thought leaders to critically reflect on some of these.

2. Compromising food safety for achieving sufficiency?

Intensive production systems have soared under the pressure to increase yield. This has been further facilitated by the continuous concentration of the food industry into bigger entities and the economies of scale to reduce production costs. Should this intensification and industrialisation continue – driven by population growth and offsetting losses caused by a worsening climate – many issues may arise.

Beyond the biodiversity and environmental effects of the use of a limited number of high-yield species or varieties in intensive farming, these crops themselves are also more susceptible to disease and pests. Fertilisers must be supplied regularly to ensure the necessary high crop yield and the supply and access to these is also finite and complex. Take phosphate (P) as an example; the amount of accessible high quality phosphate rock is low and diminishing fast; risks to animal and human health are associated with the use of low quality P-fertilisers containing worrying levels of heavy metals such as arsenic, cadmium and lead (Jiao et al., 2012). Similarly, the increasing use of antimicrobials in animal farming to prevent the spread of diseases has led to the development of resistant animal and zoonotic pathogens. This resistance may even compromise the effectiveness of antibiotic treatments for different human diseases (ECDC/EFSA/EMA, 2015). The global consumption of antimicrobials in livestock farming is nonetheless projected to rise by 67% by 2030, due to the growing number of animals raised and the continuous shift towards intensive farming systems (Van Boeckel et al., 2015). All these issues need to be looked at closely.

Curbing antimicrobial resistance, for example, is already a priority globally (World Health Organization, 2015b) and in the EU as well (European Commission, 2017). Actions taken or being discussed include banning the use of antimicrobial feed additives, rethinking the currently practiced animal husbandry system, enhancing prevention, use of alternative treatments, surveillance and cooperation at international level.

3. Stretching the limits to ensure food safety - compromising local food sufficiency?

Yet, while efforts to increase food production as described above are most likely to continue, it has been estimated that, worldwide, at least one third of the food produced is wasted (FAO, 2011). This is a crucial issue that is being addressed through the SDGs and also in the EU, with a shift towards a circular economy that has placed waste reduction, recycling and reuse at centre-stage. Technological innovation such as intelligent packaging (time-temperature indicators, freshness indicators) can help supply chain operators to optimise logistics to reduce waste in other steps of the food chain. More can be done at consumer level, as, at least in the EU, more than half of food waste originates at household level (Stenmarck et al., 2016). There may be tensions here too though; population and individual knowledge are crucial for reducing food waste without compromising food safety. And beyond consumers, food and feed safety-related measures should not be placing unnecessary burden on food producers, food chain operators, trade and eventually on food security. Low maximum levels for residues and contaminants ensure a high level of food safety but could be linked to food waste and food security issues at a local level by "legally" limiting the availability of food. Will a time come when such levels of "waste" become unacceptable and trade-offs need to be discussed?

In what regards recycling and waste reduction more generally, it is worth noting that (re-)introduction of either food or organic side stream products in the food chain may also lead to food and feed safety concerns and again a balance must be sought. The Bovine Spongiform Encephalopathy (BSE) outbreak is a good reminder of this kind of unintended consequences. Regional food systems, based on a circular economy and self-sufficiency, where 'do-it-yourself' food production and processing niches may be more widespread, appear more vulnerable in this regard. This niche reality may indeed grow further, triggered by factors such as rising food prices or trends for regional or organic products. In such a scenario, emphasis must be placed on the communication of associated risks and the provision of education and best practice guidance to these "prosumers", and official controls may need to be revisited.

On the other hand, novel technologies, ingredients and products can contribute to keeping the system competitive and make it sustainable in times of resource scarcity. However, they could harbour new food safety risks. Risks can also arise from the way food is retailed (e- and m-commerce) and food adulteration. Fast technology uptake can challenge the ability to perform efficient and timely risk assessments. Applying the precautionary principle can eventually cause delays in the approval of novel technologies and products for use in the EU. Establishing preparedness mechanisms that could be used to facilitate product approval in emergency situations could be beneficial for ensuring food sufficiency.

4. Can consumer scepticism compromise innovation and food sufficiency?

While rigorous assessment of risks are undoubtedly based on the best science, more emphasis on other legitimate factors such as socio-economic and ethical aspects is needed in order to assess new technologies and, most importantly, involve citizens. In addition to a legitimate need for citizens to be satisfied about these issues before accepting novel foods or technologies, there is currently a worrying trend towards distrusting science. Such scepticism about the impact of different technologies could prevent the uptake of promising innovations, even though safety may not be compromised at all, unless transparency and citizen engagement is sought early on in the process.

This could be achieved by applying the Responsible Research and Innovation (RRI) concept[1] which provides for a (still developing) approach to ensure that research and innovation is socially desirable. In particular the direct involvement of citizens throughout all stages of

[1] European Commission. Horizon 2020 - Responsible research & innovation, https://ec.europa.eu/programmes/horizon2020/en/h2020-section/responsible-research-innovation (accessed 23 October 2017)

research is an important element. While the concept is being included and advanced in public research (e.g. EU funded projects such as Engage 2020,[2] RRI Tools,[3], INPROFOOD[4] or CIMULACT,[5] the RRI concept still needs to be further integrated into corporate management (Stahl et al., 2017). However, also the food industry has identified the involvement of citizens in food innovation and production as an important challenge to tackle (European Technology Platform (ETP) "Food for Life," 2016). Different levels of citizen engagement are currently developed and applied, ranging from dialogues and consultations to active contributions (e.g. data collection via crowd sourcing), collaboration (e.g. analysing data, refining the project design) to co-creation of projects (e.g. citizens being involved in all steps of the research project) (Figueiredo Nascimento et al., 2016). Conceivably, citizens could also support risk assessment and post-market monitoring by collecting and sharing data on the use and effects of food products (Mylona et al., 2016). These approaches, organised by researchers or experts, are increasingly complemented by bottom-up initiatives, encompassing self-organised do-it-yourself science by crowd-funded initiatives, hacker communities or fab labs (Bauer et al., 2016).

These concepts might also help in developing innovative solutions for managing the plethora of easily accessible but often misleading, factually-wrong, or conflicting information on food safety and nutrition, which will be necessary for dealing with future food insecurity situations.

5. And could innovation for nutrition and health compromise food safety?

The increasing dominance of foods high in fat, sugar and salt and the decreased consumption of fresh produce challenge the "nutritious" attribute of our diet. Combined with snacking behaviour associated with busy schedules and increasingly sedentary lifestyles, diets are having devastating health consequences and the burden of disease attributable to diets and lifestyle may well increase further in the future. Furthermore, the impacts of a changing climate in the coming years may put further strain on the availability of fresh produce, in particular in self-sufficient systems. Paradoxically as it may seem, the desire for a healthful diet is pervasive and food products promising health benefits abound. The future may prove even more creative, e.g. with "medicalisation" of foods. Concerns may arise though, if individuals consume cocktails of nutrients and nutraceuticals in excess of recommendations, possibly even together with pharmaceuticals within the context of personalised nutrition and personalised medicine. A regulatory framework may be needed for products that fall outside the current nutrition and health claims legislations in the EU or in similar legal frameworks around the globe.

6. A possible future

The areas identified for possible trade-offs give an indication for the interlinkages and complexities inherent to the food system. They showcase the need to consider the upcoming challenges within the food system, taking into account all aspects of food security. Co-ordination and coherence between different policies is essential; the links between agricultural, food and nutrition or environmental policies are clear from these discussions but many others exist, e.g. to education, social, employment and fiscal policies. As awareness of the current failings of the (global) food system grows, possibly exacerbated by future challenges, the calls for a more appropriate, comprehensive approach gain ground, be it a systems thinking approach, a comprehensive (common) EU food policy or a combination of both (e.g. IPES-Food, 2017; FAO and WHO, 2014; Hawkes et al., 2012; van't Veer et al., 2017).

Our findings strongly support the notion that future research and policies need to be integrative and more sensitive to impacts on food safety and nutrition aspects. This will be key to achieve nutrition security and healthy lifestyles while ensuring sufficiency and sustainability of production of safe and affordable foods on our way towards 2050. This may not always result in a win-win outcome; collaboration between all stakeholders in the food chain and well-informed and engaged citizens will be indispensable to find compromises and secure benefits. Policy makers from local to global level and across the different policy areas will have an important role to play. They can provide the urgently needed frameworks and spaces for these discussions to flourish. The spaces exist in many instances – inter-ministerial/sectoral groups, stakeholder fora, roundtables, consumer groups, vocal NGOs - but need to be strengthened and more inclusive. At the EU level, the EU Better Regulation Package (European Commission, 2015), for example, emphasizes strongly the need for citizens and stakeholders to contribute throughout the policy and law-making process.

Research too needs more inclusivity and a wider reach, also in terms of interdisciplinarity at all stages of research, from planning (evaluation of proposals) to publication and dissemination.

Only when research and policies embrace the complexity of the food system(s) we will be able to move towards future food polices that will put us on the right track for achieving food security.

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[2] Engage 2020 – Engaging society in Horizon 2020, http://engage2020.eu/ (accessed 23 October 2017)
[3] RRI Tools, https://www.rri-tools.eu/ (accessed 23 October 2017)
[4] Inprofood – Towards sustainable food research, https://www.inprofood.eu/ https://www.inprofood.eu/4
[5] CIMULACT – Citizen and multi-actor consultation on Horizon 2020, http://www.cimulact.eu/ (accessed 23 October 2017)

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